

TITAN

Application diagrams:
Intended use.

Window systems

Door systems

Comfort systems



Function

Application diagrams show the maximum sash dimensions at a specific element weight for which a piece of hardware may be used. Application diagrams focus exclusively on the property of **durability** and may also provide information on the load-bearing capacity of the hardware when subjected to an additional load according to EN 14608 (Figure A.1).

Basic principles

Application diagrams are produced on the basis of the ift guideline "Preparation of application diagrams for turn and tilt-turn hardware". The guideline provides more information on using application diagrams and can be downloaded at www.anwendungsdiagramme.de.

Abbreviations and icons

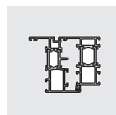
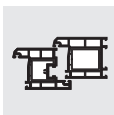
The following abbreviations and icons are used in this document and in all other application diagrams.

Abbreviations

CG	Reduction in glass size [mm]	GG	Specific element weight [kg/m ²]
FB	Sash width [mm]	FFB	Sash rebate width [mm]
FFH	Sash rebate height [mm]	FFH AB	Sash rebate height up to the start of the arched head [mm]
FFH BS	Sash rebate height on the hinge side [mm]	FH	Sash height [mm]
FH AB	Sash height up to the start of the arched head [mm]	FH BS	Sash height on the hinge side [mm]
PG	Profile weight [kg/m]	Q_{B/H}	Max. width-to-height ratio (= FFB/FFH)

Icons

	Tilt-turn window element		Turn window element
	Tilt window element		Arched head window element
	Rounded head window element		Angled window element
	Triangular window element		Maximum permissible sash weight
	Frame material: timber		Frame material: PVC
	Frame material: light metal		



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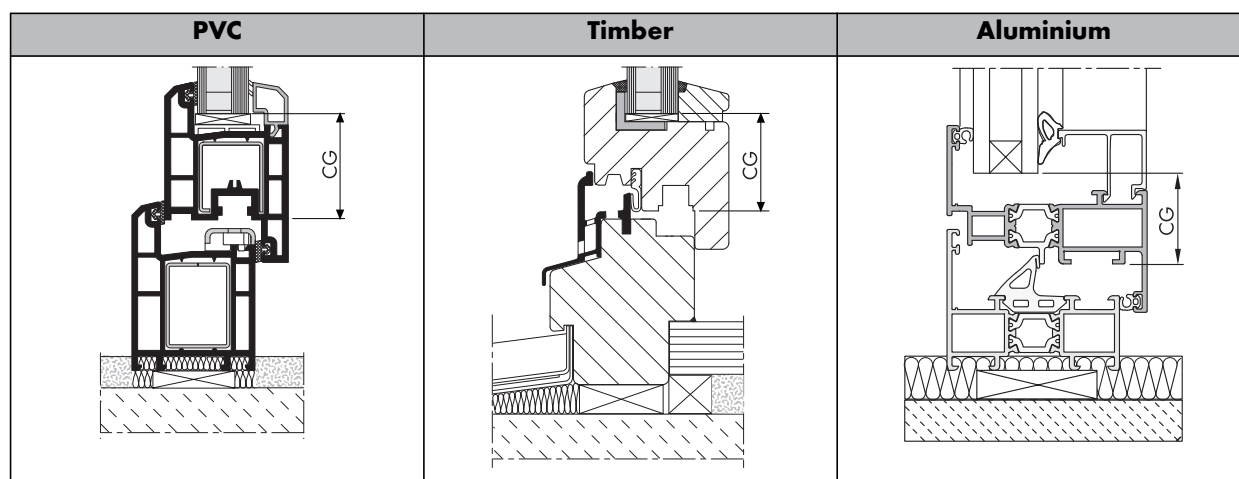
Requirements for use

Please note and comply with the following points at all times when using application diagrams and hardware:

- The application ranges for the hardware are derived from the size specifications in the assembly instructions/component catalogue **and** from those in the relevant application diagram. If the values differ, the data in the assembly instructions always applies, with the data in the component catalogue providing an alternative.
- If a combination of components with different load-bearing capacities is being used, the application diagram for the component with the lowest load-bearing capacity is always the one that applies.
- Guidelines/notes on the product and on liability (VHBH directive as well as the other applicable documents listed here in -directive can be downloaded at www.beschlagindustrie.de/ggsb/richtlinien.asp).
- Specifications from the profile manufacturers/system owners (e.g. for window systems with frames made of timber, PVC, light metal or combinations of materials) or DIN 68121 "Timber profiles for windows and French windows" – with particular regard to potential restrictions for the sash dimensions and sash weight.
- Guidelines and, where applicable, application diagrams in the product documentation supplied by the relevant glass or infill panel manufacturer.
- In accordance with the application diagrams, the hardware is to be used exclusively for window elements which are installed vertically in walls in permanent structures, unless otherwise indicated.
- The application diagrams apply exclusively to hardware used in window elements which open inwards, unless otherwise indicated.
- In accordance with the relevant application diagrams, the hardware is to be used exclusively for window elements in which the reduction in glass size (**CG**) is greater than or equal to the specified value, and the profile weight (**PG**) is less than or equal to the specified value.
- If the application range approved in the application diagrams is exceeded, there is a risk of damage to persons or property. If the application ranges are exceeded, our liability ceases to the extent permissible under law.

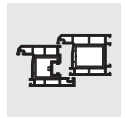
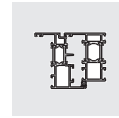
Reduction in glass size

The reduction in glass size (**CG**) is to be determined for each material (timber, PVC, light metal or combinations of materials) as shown in the following drawings.



Profile weight

The profile weight is the specific weight per running metre of the sash profile (complete sash profile including all reinforcements, glazing beads, etc.).

**Element weight**

When calculating application diagrams, various values are taken into account for the specific element weight (**GG**) and illustrated in graphs in the application diagram.

The specific element weight (**GG**) covers all filling materials (which are suitable for window construction) – glazing with all kinds of structural parts as well as infill panels made of different materials and material combinations.

Determining the element weight

For glazing, the specific element weight (**GG**) for a glass mass of 2.5 kg/m² mm, for example, is calculated as follows:

$$GG \approx 2.5 \text{ kg/m}^2 \text{ mm} \times \text{total glass thickness}$$

Example

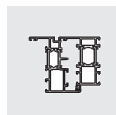
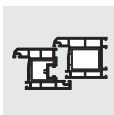
Glazing made of 2 glass panes, each with a thickness of 4 mm, total glass thickness = 8 mm

$$GG \approx 2.5 \text{ kg/m}^2 \text{ mm} \times 8 \text{ mm}$$

$$GG \approx 20 \text{ kg/m}^2$$

Additional examples of specific element weights for different glass thicknesses are shown in the following table.

Mass of glass per mm glass thickness [kg/m ² mm]	Glass thickness	Element weight (GG) [kg/m ²]
2,5	1	2,5
2,5	8	20
2,5	12	30
2,5	16	40
2,5	20	50
2,5	24	60
2,5	28	70



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Reading the data

In the subsequent examples, the following has been assumed:

- The reduction in glass size (**CG**) for the window element is greater than or equal to the value specified in the application diagram.
- The profile weight (**PG**) of the window element is less than or equal to the value specified in the application diagram.
- The bases of testing and calculation specified in the application diagram relate to the application of the hardware.
- The additional load taken into account in the application diagram relates to the application of the hardware.
- The window manufacturer has provided evidence that the load-bearing components have been fixed in accordance with TBDK using the values specified in the application diagram.

Determining the valid application range for a specific element weight

The permissible application range for use of the hardware is highlighted in grey in the application diagrams. However, the entire grey area is not valid; in each case, it is only the part to the **left** of the curve for the relevant element weight (**GG**) which applies.

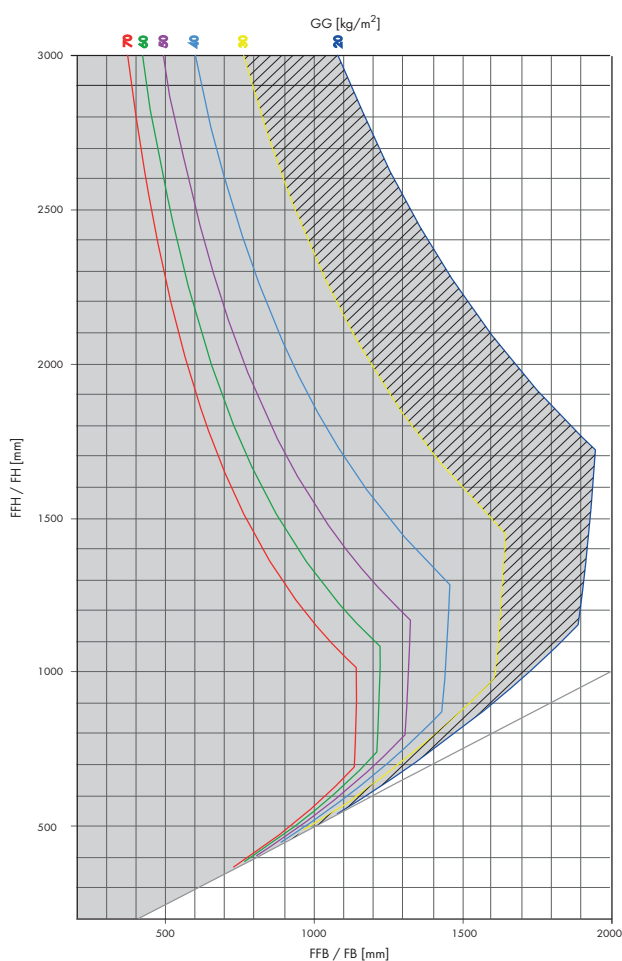
*Note: This example, and all subsequent examples, use the reference values **FFH** and **FFB**. All descriptions and results for each of the examples also apply correspondingly for the reference values **FH** and **FB**.*

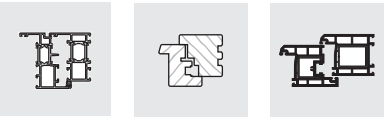
Example 1

The permissible FFH and FFB are to be determined from the accompanying application diagram for window elements with the specific element weight **GG = 30 kg/m²**. To do this, we must consider the graph for this element weight.

The area to the **left** of the curve shows the permissible range for a specific element weight of **GG = 30 kg/m²**.

The area to the **right** of the curve (shaded here for the purposes of clarification) shows the impermissible range for a specific element weight of **GG = 30 kg/m²**.





Determining the valid application range for the maximum specific element weight

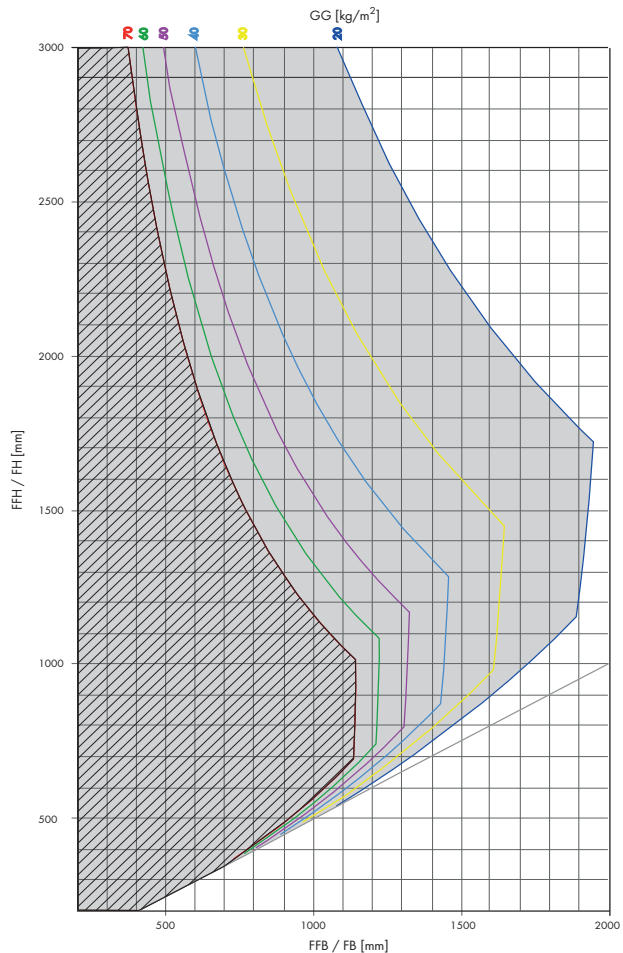
The hardware may only be used in sashes which use glazing or infill panels whose specific element weight is less than or equal to the maximum specific element weight shown in the relevant application diagram.

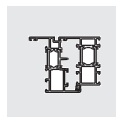
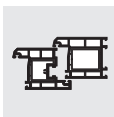
Example 2

In the following example, **70 kg/m²** is specified as the maximum specific element weight. Element weights over **70 kg/m²** are, therefore, generally not permitted in this example.

The permissible FFH and FFB are to be determined from the accompanying application diagram for window elements with the specific element weight **GG = 70 kg/m²**. To do this, we must consider the graph for this element weight.

The area to the left of the curve (shaded here for the purposes of clarification) shows the permissible range for the maximum specific element weight of **GG = 70 kg/m²**.





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Example 3

The following sash is to be fitted with hardware according to the associated application diagram:

- Intended sash rebate width (**FFB**) = **1.300 mm**
- Intended sash rebate height (**FFH**) = **1.800 mm**
- Intended glazing 3 x 4 mm float glass – **GG = 30 kg/m²**

Basis of testing and calculation:

Tilt-turn test according to QM 328 Appendix 2 – Figure A

- 15.000 tilt & turn cycles
- 10.000 turn cycle

Additional loads taken into account in accordance with EN 14608 (Figure A.1)/Class 4 in accordance with EN 13115 (800 N)

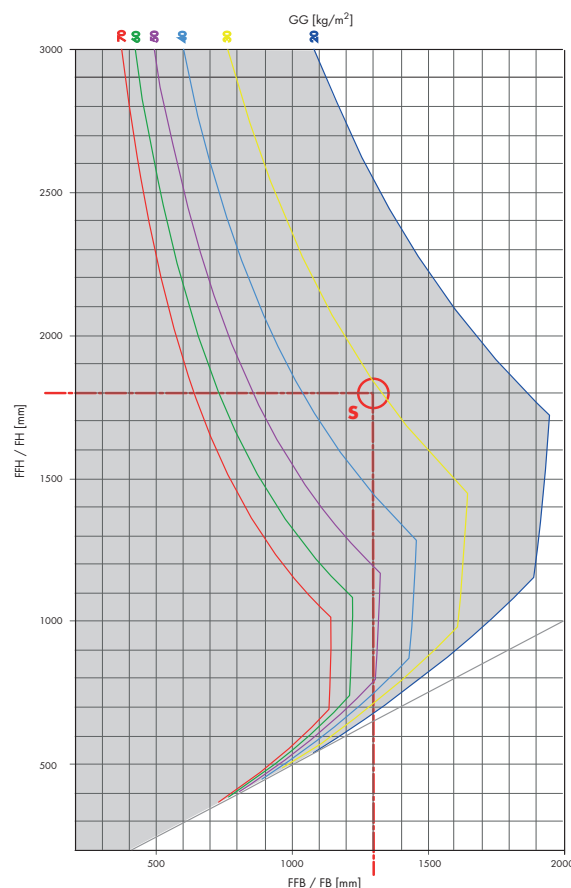
Requirements for the use of the application diagram:

Proof that the load bearing components have been fixed to the window system by the window manufacturer in accordance with TBDK using the following forces:

- To the top hinge with 2.710 N
- To the bottom hinge with 2.890 N

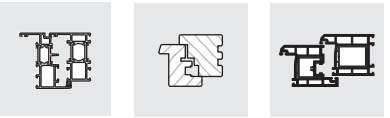
Comply with the following values for all window systems:

- Max. width-to-height ratio **$Q_{B/H} \leq 2,0$**
- Reduction in glass size **$CG \geq 28 \text{ mm}$**
- Profile weight **$PG \leq 3,25 \text{ kg/m}^2$**



Result after reading the data in the application diagram:

- The point of intersection (**S**) for **FFB x FFH = 1.300 x 1.800 mm** is to the left of the curve in the permissible range for the specific element weight **GG = 30 kg/m²**.
- The hardware **can be used** as indicated in the associated application diagram.


Example 4

The following sash is to be fitted with hardware according to the associated application diagram:

- Intended sash rebate width (**FFB**) = **1.400 mm**
- Intended sash rebate height (**FFH**) = **1.900 mm**
- Intended glazing 3 x 4 mm float glass – **GG = 30 kg/m²**

Basis of testing and calculation:

Tilt-turn test according to QM 328 Appendix 2 – Figure A

- 15.000 tilt & turn cycles
- 10.000 turn cycle

Additional loads taken into account in accordance with EN 14608 (Figure A.1)/Class 4 in accordance with EN 13115 (800 N)

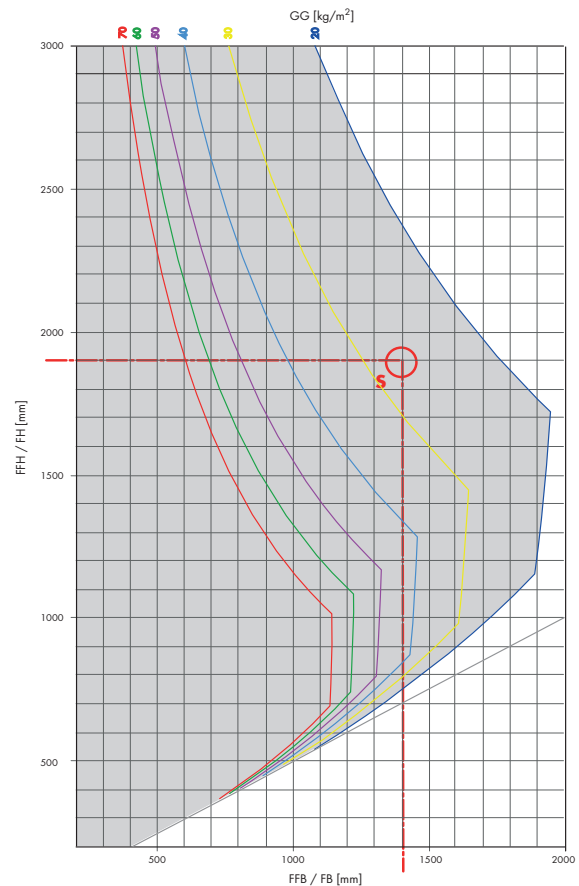
Requirements for the use of the application diagram:

Proof that the load bearing components have been fixed to the window system by the window manufacturer in accordance with TBDK using the following forces:

- To the top hinge with 2.710 N
- To the bottom hinge with 2.890 N

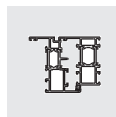
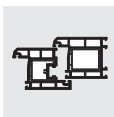
Comply with the following values for all window systems:

- Max. width-to-height ratio **$Q_{B/H} \leq 2,0$**
- Reduction in glass size **$CG \geq 28 \text{ mm}$**
- Profile weight **$PG \leq 3,25 \text{ kg/m}^2$**



Result after reading the data in the application diagram:

- The point of intersection (**S**) for **$FFB \times FFH = 1.400 \times 1.900 \text{ mm}$** is to the right of the curve in the impermissible range for the specific element weight **$GG = 30 \text{ kg/m}^2$** .
- The hardware **cannot be used** as indicated in the associated application diagram.



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Example 5

The following sash is to be fitted with hardware according to the associated application diagram:

- Intended sash rebate width (**FFB**) = **1.600 mm**
- Intended sash rebate height (**FFH**) = **2.200 mm**
- Intended glazing 2 x 4 mm float glass – **GG = 20 kg/m²**

Basis of testing and calculation:

Tilt-turn test according to QM 328 Appendix 2 – Figure A

- 15.000 tilt & turn cycles
- 10.000 turn cycle

Additional loads taken into account in accordance with EN 14608 (Figure A.1)/Class 4 in accordance with EN 13115 (800 N)

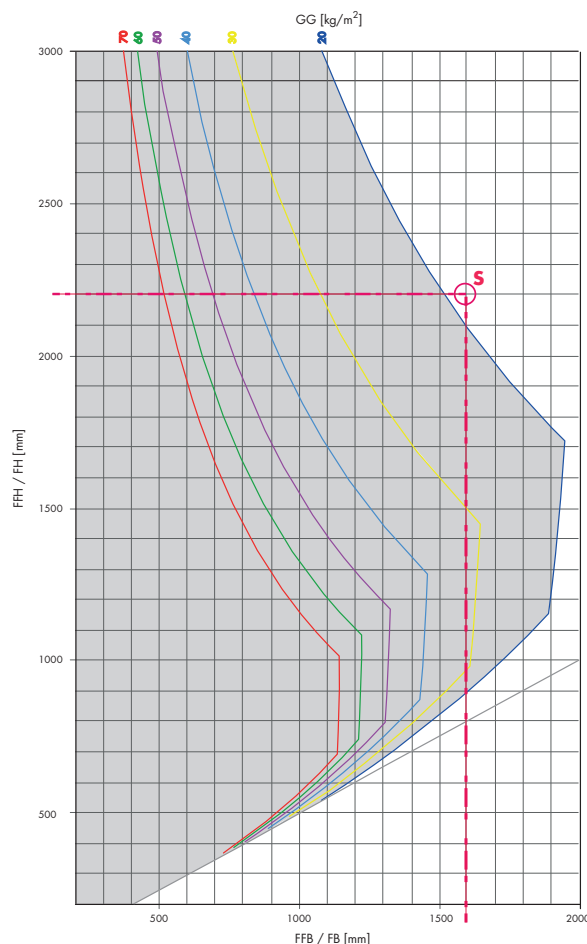
Requirements for the use of the application diagram:

Proof that the load bearing components have been fixed to the window system by the window manufacturer in accordance with TBDK using the following forces:

- To the top hinge with 2.710 N
- To the bottom hinge with 2.890 N

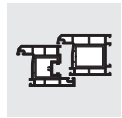
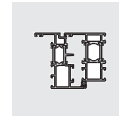
Comply with the following values for all window systems:

- Max. width-to-height ratio **$Q_{B/H} \leq 2,0$**
- Reduction in glass size **$CG \geq 28 \text{ mm}$**
- Profile weight **$PG \leq 3,25 \text{ kg/m}^2$**



Result after reading the data in the application diagram:

- The point of intersection (**S**) for **FFB x FFH = 1.600 x 2.200 mm** is to the right of the curve in the impermissible range for the specific element weight **GG = 20 kg/m²**.
- The hardware **cannot be used** as indicated in the associated application diagram.

**Example 6 (specific element weight between the curves)**

The following sash is to be fitted with hardware according to the associated application diagram:

- Intended sash rebate width (**FFB**) = **1.000 mm**
- Intended sash rebate height (**FFH**) = **2.100 mm**
- Intended glazing – **GG** = **35 kg/m²**
- For a specific element weight of 35 kg/m², an additional curve is plotted in the application diagram whose position and progression are determined by means of linear interpolation.

Please note and comply with the following points at all times for interpolation:

- For specific element weights (GG) less than 50 kg/m², linear interpolation is only permissible if there is a maximum difference of 10 kg/m² between the two curves in the application diagram.
- For specific element weights (GG) greater than 50 kg/m², linear interpolation is only permissible if there is a maximum difference of 20 kg/m² between the two curves in the application diagram.

Basis of testing and calculation:

Tilt-turn test according to QM 328 Appendix 2 – Figure A

- 15.000 tilt & turn cycles
- 10.000 turn cycle

Additional loads taken into account in accordance with EN 14608 (Figure A.1)/Class 4 in accordance with EN 13115 (800 N)

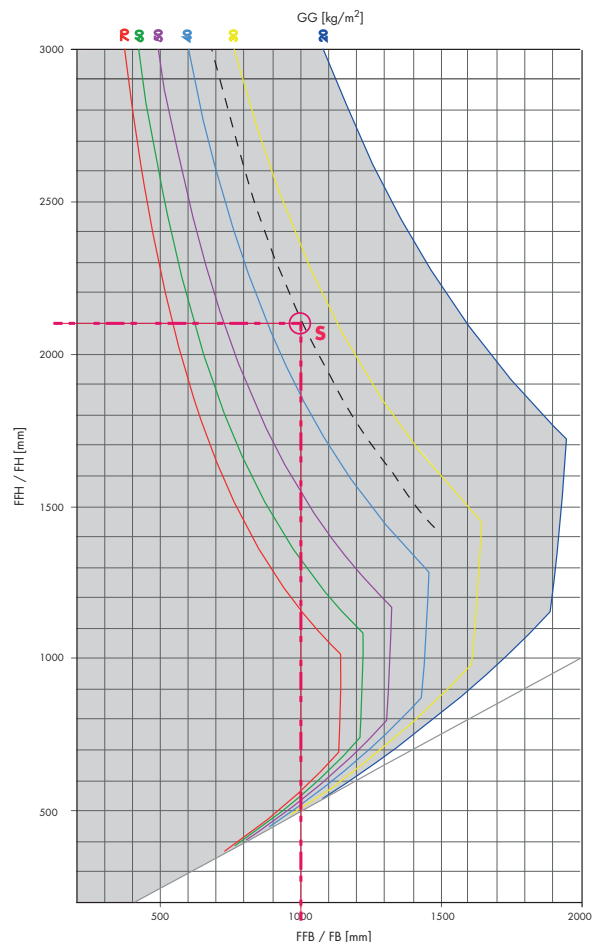
Requirements for the use of the application diagram:

Proof that the load bearing components have been fixed to the window system by the window manufacturer in accordance with TBDK using the following forces:

- To the top hinge with 2.710 N
- To the bottom hinge with 2.890 N

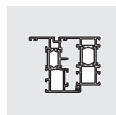
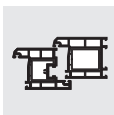
Comply with the following values for all window systems:

- Max. width-to-height ratio **Q_{B/H} ≤ 2,0**
- Reduction in glass size **CG ≥ 28 mm**
- Profile weight **PG ≤ 3,25 kg/m²**



Result after reading the data in the application diagram:

- The point of intersection (**S**) for **FFB x FFH = 1.000 x 2.100 mm** is located exactly on the curve determined by linear interpolation for the specific element weight **GG = 35 kg/m²**, and is therefore within the permissible range for this element weight.
- The hardware **can be used** as indicated in the associated application diagram.



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Example 7 (Special areas during interpolation)

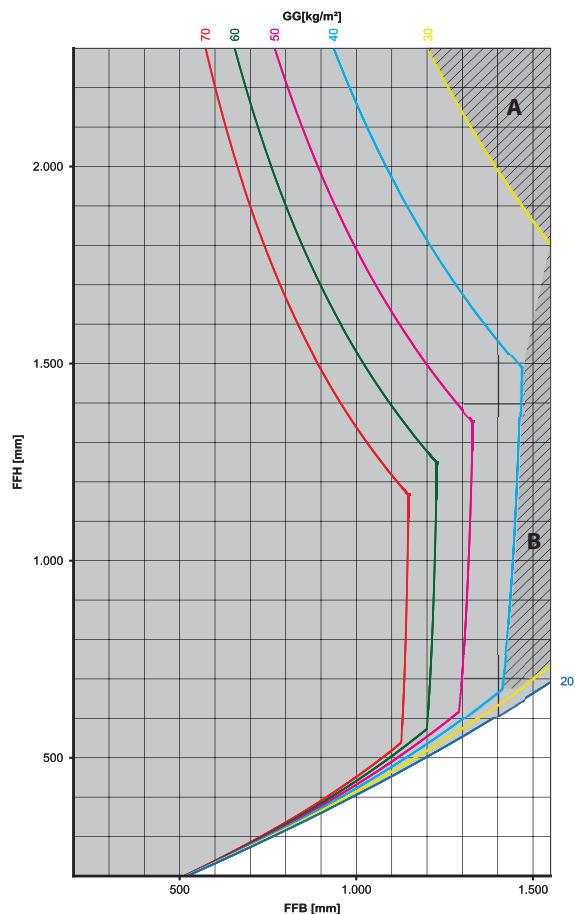
The procedure shown in example 6 (diagram) for specific element weights between the curves only applies if two curves are displayed in the diagram, between which linear interpolation is possible.

Example A

In the area to the right next to the curve for the specific element weight **GG = 30 kg/m²** (also cross-hatched here for illustration purposes), no additional curve is displayed here for linear interpolation and only elements with a specific weight of **GG = 20 kg/m² maximum** may be used in this area (the next lowest level of specific element weight).

Example B

In the area to the right next to the curve for the specific element weight **GG = 40 kg/m²** (also cross-hatched here for illustration purposes), no additional curve is displayed here for linear interpolation and only elements with a specific weight of **GG = 30 kg/m² maximum** may be used in this area (the next lowest level of specific element weight).



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